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10/798,347

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Giuseppe Rossi

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10/19/2007

DICKSTEIN SHAPIRO LLP
1825 EYE STREET NW
Washington, DC 20006-5403

EXAMINER

NGUYEN, VINCENT Q

ART UNIT

PAPER NUMBER

2858

MAIL DATE

DELIVERY MODE

10/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/798,347

Applicant(s)

ROSSI ET AL.

Examiner

Vincent Q. Nguyen

Art Unit

2858

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 68-112 is/are pending in the application.
- 4a) Of the above claim(s) 70-75, 95-102 and 104-112 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 68, 69, 76-94 and 103 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Claims 70-75 and 95-112 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 4/25/2007.

The Election/Restrictions requirement is thus made FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 68, 69, 76-79, 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glukhovsky et al. (US 6,607,301) in view of Sakaue (US 4,162,411 A).

Regarding claims 68, 69, 76-79 Glukhovsky et al. discloses method of determining temperature of an imager chip 40 (Fig. 3)(column 4 lines 62-64), comprising, measuring a dark current value of a pixel on said chip, and determining a chip temperature representation based on said measured dark current value and stored values (known equations)(column 3, lines 51-54).

While Glukhovsky et al. discloses method (Fig. 1) of determining temperature 17 of image sensor chip 40 (Fig. 3) by obtaining dark current data 13 (column 4 lines 37-

50) it did not specifically disclose storing a fabrication process dependent value for an imager chip storing at least one chip dependent value representing a measured pixel dark current reference value and a reference temperature at which said chip dependent dark current reference value was measured but would have been obvious to do so since Glukhovsky et al. suggested performing calibration (column 3 lines 51-57).

Sakaue discloses imager chip (CCD device) wherein the amount of dark current changes due to temperature (thermal excitation) and depends on semiconductor substrate and manufacturing process of the device (column 1 lines 22-27).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Glukhovsky et al. by storing in the imager chip a fabrication process dependent value for an imager chip storing at least one chip dependent value representing a measured pixel dark current reference value and a reference temperature at which said chip dependent dark current reference value was measured for performing calibration and accurately measuring image sensor temperature since Glukhovsky et al. disclosed performing calibration and Sakaue disclosed that the amount of dark current in imager chip (CCD device) changes due to temperature (thermal excitation) and depends on semiconductor substrate and manufacturing process of the device.

Regarding claim 86, Glukhovsky et al. teaches a plurality of pixels 48 (array) (Fig. 3) supplying dark current signals, which are selectively used to calculate a plurality of temperature representations, each dark current signal being associated with at least one circuit used on said imager (Figure 1, col. 4, lines 37-41, column 5 lines 1-10).

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7. Claims 80-85, 87-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glukhovsky et al. (US 6,607,301) and Sakaue in view of Kono (JP402022873A).

Regarding claims 80-85, 87-92, Glukhovsky et al. as modified by Sakaue disclosed all of the claimed limitations as set forth above except correcting at least one temperature dependent parameter of imager device.

Regarding claims 80, 81 Kono discloses temperature compensation circuit of bias circuit for imager device (photodiode) wherein a temperature dependent parameter is a current parameter which is changed by a changed amount in a dark current to compensate for changes in ambient temperature (abstract).

Regarding claims 82-92 while Kono disclosed controlling the current flowing in imager device (photodiode) it did not expressly disclose correcting a temperature dependent parameter comprising resistance, voltage, impedance, and capacitance. All of these parameters are considered obvious variants for controlling electric current flowing in the imager device by controlling impedance or the voltage as required for ambient temperature compensation in imager device (photodiode) disclosed by Kono.

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Glukhovsky et al. and Sakaue by including a circuit for correcting temperature dependent parameters in imager device including resistance, voltage, impedance and capacitance for compensating for changes in ambient temperature and the generated dark current as disclosed by Kono for accurately measuring imager temperature.

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8. Claims 93, 94, 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glukhovsky et al. (US 6,607,301) and Sakaue (US 4,162,411 A) in view of Wand (US 6,267,501 B1).

Regarding claims 93, 94, 103 Glukhovsky et al. as modified by Sakaue disclosed all of the claimed limitations as set forth in the rejection of claim 68 above including integrating unit 22 disclosed by Glukhovsky et al. (Fig. 2) and the process of collecting samples controlled by integrating unit (column 4 lines 6-36). While Glukhovsky et al. disclosed sampling is controlled by integrating unit it did not explicitly disclose sampling dark pixel signal with first and second integration time. However, sampling by variable integration is well in the art of measuring and testing routinely performed for improving signal to noise ratio of measurement signals.

Wand discloses method of calibration for measuring temperature by a detector including measuring the voltage of each pixels by varying the sampling integration time (column 4 lines 54-67) for improving signal to noise ratio of measurement signals required to accurately measure temperature.

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Glukhovsky et al. and Sakaue by modifying the integrating unit disclosed by Glukhovsky et al. for sampling dark current signal (voltage) with first and second integration time since Wand disclosed that varying the sampling integration time is beneficial for accurately measuring temperature.

Response to Arguments

4. Applicant's arguments filed 9/04/2007 have been fully considered but they are not persuasive.

a) In response to Applicant's argument that: "Notwithstanding, the Office Action initially asserts (p. 6) that it "would have been obvious to do so since Glukhovsky et al. suggested performing calibration (column 3 lines 51-57)." This bare, unsupported assertion is traversed as failing to comply with the requirements set forth in MPEP § 2142 for establishing a prima facie case of obviousness. As the Office Action pointed out, Glukhovsky fails to teach or suggest many limitations of claim 68. The portion of Glukhovsky relied upon by the Office Action for "performing calibration" discloses a "processor capable of... calculating the image sensor temperature 17 using the known equations derived for thermal noise. It will be appreciated that these equations are an approximation of a complex phenomenon and that calibration should be employed in order to deduce the actual calculations that will be applied." The foregoing disclosure fails to teach or suggest the above-quoted limitations of claim 68, and the Office Action fails to explain otherwise" Glukhovsky et al. fails to teach or suggest the above-quoted limitations of claim 68, and the Office Action fails to explain otherwise."

In the Office action, examiner clearly states that: "While Glukhovsky et al. discloses method (Fig. 1) of determining temperature 17 of image sensor chip 40 (Fig. 3) by obtaining dark current data 13 (column 4 lines 37-50) it did not specifically disclose storing a fabrication process dependent value for an imager chip storing at least one chip dependent value representing a measured pixel dark current reference

value and a reference temperature at which said chip dependent dark current reference value was measured but would have been obvious to do so since Glukhovsky et al. suggested performing calibration (column 3 lines 51-57).

Sakaue discloses imager chip (CCD device) wherein the amount of dark current changes due to temperature (thermal excitation) and depends on semiconductor substrate and manufacturing process of the device (column 1 lines 22-27).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Glukhovsky et al. by storing in the imager chip a fabrication process dependent value for an imager chip storing at least one chip dependent value representing a measured pixel dark current reference value and a reference temperature at which said chip dependent dark current reference value was measured for performing calibration and accurately measuring image sensor temperature since Glukhovsky et al. disclosed performing calibration and Sakaue disclosed that the amount of dark current in imager chip (CCD device) changes due to temperature (thermal excitation) and depends on semiconductor substrate and manufacturing process of the device." The Office action is thus adequately interpreted the limitations of the claims.

b) In response to Applicant's argument that: "Initially, Sakaue fails to teach or suggest "storing a fabrication process dependent value for an imager chip." The portion of Sakaue relied upon by the Office Action discloses that the "amount of dark current charge depends on defects of a semiconductor substrate and the manufacturing process of the device." The foregoing disclosure teaches only that dark current may

depend on the manufacturing process. This fails to teach or suggest determining a "process dependent value," storing a "process dependent value, "or" determining a chip temperature representation based on said ... stored values." And, the Office Action fails to explain how a disclosure that the dark current may depend on manufacturing teaches the limitations of claim 68. Thus, the references, whether taken alone or in combination, fail to teach or suggest all of the limitations of claim 68, and claim 68 is allowable based on at least this reason."

It is well known that the dark current is typically generated usually as a result of surface damage (e.g., dangling silicon bonds) to the active silicon regions of the unit pixel, such as the photodiode region, resulting from manufacturing processes such as gate and spacer etching steps. In addition, dark current can be generated as a result of damage to the silicon at the interface between an isolation region and the active silicon region. In general, the amount of dark current produced is a function of temperature and time, and the amount of dark current produced can vary significantly from pixel to pixel depending upon operating conditions. As a result, dark current can result in reduced pixel sensitivity and lower the dynamic range of the image sensor device (See Katoh et al. US 5,625,413 attached in PTO 892 of this Office action). Therefore, the step of "storing a process dependent value" or determining a chip temperature representation based on stored values" is the typical way in the art to enhance the sensitivity of the imager sensor.

c) In response to Applicant's argument that: "Even if Sakaue did disclose the limitations of claim 68 (and it clearly does not, as explained above), there would be no

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suggestion or motivation to combine the references as suggested by the Office Action. The Office Action reasons that since Glukhovsky discloses "calibration" and Sakaue discloses that dark current "depends" on manufacturing, it would have been obvious to combine such teachings. To the contrary, the teachings of the references cited by the Office Action are not related and would not suggest or motivate a combination".

Pertinence to the discussion of part b) above, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the teaching of the prior art of Glukhovsky et al., Sakaue, Wand and Kono adequately disclose the prima facie for the one skill in the art to combine as required under 35 U.S.C 103 (See MPEP 2144).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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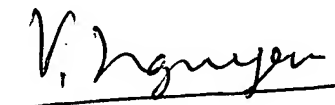
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vincent Q. Nguyen whose telephone number is (571) 272-2234. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Hirshfeld can be reached on (571) 272-2168. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


10/14/07

Vincent Q. Nguyen
Primary Examiner
Art Unit 2858